



U.S. Environmental Protection Agency
Region 8
Technical and Management Services

Laboratory Services Program

Certificate of Analysis

Ref: 8TMS-L

MEMORANDUM

Date: 08/11/15

Subject: Analytical Results--- **Upper Animas_Surface Water 3_AUG 2015_A096 / A-098**

From: Don Goodrich; EPA Region8 Analytical Chemistry WAM

To: Paula Schmitt
Superfund
8 EPR-SR

Received Sample Set(s), [Work Order : Date Received]:
[C150803 : 08/11/2015]

Attached are the analytical results for the samples received from the Upper Animas Surface Water 3_AUG 2015_A096 sampling event, according to TDF A-098. All analyses were performed within their method specified holding times unless otherwise noted in the following narrative.

These samples were prepared, analyzed, and verified by the Environmental Services Assistance Team Laboratory (ESAT) according to the requirements of the Technical Direction Form (TDF).

Note: The laboratory herewith transmits this deliverable to the program/project partner for determination of "final data usability" which may include data validation and data quality assessment per and in accordance with EPA QA/G-8, *Guidance on Environmental Data Verification and Data Validation*, November 2002, EPA/240/R-02/004. Laboratory data qualifiers are applied based on the USEPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, October 2004, referred to as "NFGI".

Laboratory policy is to dispose of any remaining sample 60 days after data analysis packages are delivered to EPA. If you would like the laboratory to retain the samples for a period longer than 60 days, please contact Don Goodrich within the 60 day period at (303) 312-6687.

TDF #: A-098

Case Narrative

C150803

Quality Assessment: Unless indicated by exception, the QA/QC associated with this sample set produced data within the TDF-specified criteria.

Holding Times: All samples were analyzed within their method-specified technical holding time(s). Dissolved metals were preserved at time of receipt at the laboratory and were analyzed prior to the 24 hour wait period. No qualifiers were assigned.

1. Initial and Continuing calibration blanks (ICBs and CCBs).
Exceptions: None.
2. Preparation (PB) / Method blanks (MB)
Exceptions: In ICP-OE batch 1508070, manganese was detected in the prep blank at a level less than ten times the concentration found in samples. No qualifiers were assigned.
3. Interference Checks (ICSA / ICSAB) for ICP-MS and ICP-OE analyses only.
Exceptions: None.
4. Initial and Continuing calibration verification analyses (ICVs, SCVs and CCVs).
Exceptions: None.
5. Laboratory Control Sample (LCS) or second source analysis or SRM.
Exceptions: None.
6. Laboratory Fortified blank (LFB) / Blank spike (BS), same source as used for the matrix spikes.
PBS performed with analyses/methods requiring preparation or digestion prior to analysis.
Exceptions: None.
7. Contract Reporting Detection Limit Standard, labeled as CRA, CRDL or CRL.
Exceptions: None.
8. Laboratory Duplicate (DUP). "Source" identifies field sample duplicated in the laboratory. If either the "source" or the duplicate result is <5X the reporting limit, the %D limit of 20% does not apply.
Exceptions: None.
9. Laboratory Matrix Spike (MS) and spike duplicate (MSD). "Source" defines original field sample fortified prior to analysis. Percent recovery (%R) limits do not apply when sample concentration(s) exceed the corresponding analyte spike level by a factor of 4 or greater.
Exceptions: None.
10. Serial Dilution sample analysis (SRD). "Source" is parent field sample diluted 1:5 in the laboratory. Performed for ICP-OE and ICP-MS metals analyses. Percent difference (%D) limits do not apply when analyte concentration(s) are below 50x the source sample's MDL (or 10x it's PQL).
Exceptions: None.
11. Internal standards, criteria specified for ICP-MS analyses only, monitored at the instrument.
Exceptions: None.
12. Any calibration using more than two-points produced a correlation coefficient equal to or greater than 0.995.
Exceptions: None.

TDF #: A-098

Acronyms and Definitions:

ESAT	Environmental Services Assistance Team
J	Data Estimated qualifier (also applied to all data less than PQL, greater than or equal to MDL)
MDL	Method Detection Limit
PQL	Practical Quantitation Limit, also known as reporting limit.
RPD	Relative Percent Difference (difference divided by the mean)
%D	Percent difference, serial dilution criteria unit, difference divided by the original result
%R	Percent recovery, analyzed (less sample contribution) divided by true value
<	Analyte NOT DETECTED at or above the Method Detection Limit(MDL)
mg/L	Parts per million (milligrams per liter). Solids equivalent = mg/Kg.
ug/L	Parts per billion (micrograms per liter). Solids equivalent = ug/Kg.
NR	No Recovery (matrix spike) - Often seen for calcium/magnesium when their concentration exceeds the spike level by > 4x.
NFGI	USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review/October 2004
RE	Sample Re-analysis. Usually seen on raw data and sequences for required sample dilutions due to over-range analytes.
U	Analyte not detected at or above MDL qualifier
D	Diluted value qualifier.

Method(s) Summary :

As defined in the Technical Direction Form (TDF), some or all of the methods listed below were used for the determination of the reported target analytes.

From EPA's *Methods for the Determination of Metals in Environmental Samples*, Supplement I, May 1994, dissolved, total, and/or total recoverable metals were determined by:

- Method 200.7 / 6010B using a PE Optima ICP -OE (ICP).
- Method 200.8 / 6020 using a Perkin -Elmer Elan 6000 ICP -MS.
- Method 200.2 for total recoverable metals (only) digestion.
- Method 245.1 using a Perkin -Elmer FIMS CV AA (aqueous mercury only).

From *Standard Methods for the Examination of Water and Wastewater*, 18th Edition, 1992, Method 2340B was used for the calculated hardness determination. Hardness is reported as mg (milligram) equivalent CaCO₃ per liter (L) determined as follows:

$$\text{Calculated hardness} = 2.497 * (\text{Calcium, mg/L}) + 4.118 * (\text{Magnesium, mg/L}).$$

From EPA's *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846,

- Method 3015A was used for microwave assisted total metals digestion.
- Method 7473 was used for mercury in solids.

From EPA's *Determination of Inorganic Anions by Ion Chromatography*, Revision 2.1, 1993, Method 300.0 was used to determine the anions.

From EPA's *Methods for Chemical Analysis of Water and Wastes*, March 1983:

- Method 310.1 was followed for the alkalinity determination.
- Method 160.1 was followed for gravimetric total dissolved solids (TDS) determination.
- Method 160.2 was used for gravimetric total suspended solids (TSS) determination.
- Method 415.3 was used for total organic carbon (TOC) determination using either an Apollo 9000 or Phoenix 8000 Non-Dispersive IR (NDIR) system. Also known as dissolved organic carbon (DOC) when performed on the dissolved sample fraction.

The quality control procedures listed in the TDF request were utilized by ESAT to verify accuracy of the results and to evaluate any matrix interferences.

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods

Station ID: GKMSW01_081015

Date / Time Sampled: 08/10/15 13:17

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-02 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	91.3		ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	51500		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	7560		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	67.8		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1880		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	10700		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	< 20.0	U	ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	41.9		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	3.92		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	0.276		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	1.87		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	160		mg/L	2	1	08/11/2015	SV	1508062

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods

Station ID: GKMSW02_081015

Date / Time Sampled: 08/10/15 10:36

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-05 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	56.6		ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	36700		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	4510		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	401		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	718	J	ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	2000		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	85.6		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	32.1		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	0.535		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	2.09		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	1.65		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	3.16		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	0.551	J	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	0.736	J	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	110		mg/L	2	1	08/11/2015	SV	1508062

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods

Station ID: GKMSW04_081015

Date / Time Sampled: 08/10/15 11:47

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-08 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	29.8	J	ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	52200		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	7210		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	136		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1850		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	10300		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	54.5		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	43.0		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	0.195	J	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	4.50		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	0.541		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	2.23		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	160		mg/L	2	1	08/11/2015	SV	1508062

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods

Station ID: GKMSW05_081015

Date / Time Sampled: 08/10/15 12:37

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-11 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	40.9	J	ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	52200		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	7300		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	111		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1840		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	10300		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	24.4		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	43.8		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	0.133	J	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	4.47		ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	0.450		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	1.91		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	160		mg/L	2	1	08/11/2015	SV	1508062

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods

Station ID: GKMSW11_080915

Date / Time Sampled: 08/09/15 09:40

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-14 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	< 50.0	U	ug/L	20.0	1	08/11/2015	SV	1508062
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Calcium	48900		ug/L	100	1	08/11/2015	SV	1508062
200.7	Iron	< 250	U	ug/L	100	1	08/11/2015	SV	1508062
200.7	Magnesium	5040		ug/L	100	1	08/11/2015	SV	1508062
200.7	Manganese	1620		ug/L	2.00	1	08/11/2015	SV	1508062
200.7	Potassium	1370		ug/L	250	1	08/11/2015	SV	1508062
200.7	Sodium	3290		ug/L	250	1	08/11/2015	SV	1508062
200.7	Zinc	804		ug/L	10.0	1	08/11/2015	SV	1508062
200.8	Antimony	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Arsenic	< 2.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Barium	38.1		ug/L	5.00	1	08/11/2015	SV	1508063
200.8	Cadmium	2.93		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Chromium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Cobalt	4.79		ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Copper	2.91		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Lead	< 0.200	U	ug/L	0.100	1	08/11/2015	SV	1508063
200.8	Molybdenum	< 1.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Nickel	2.97		ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Selenium	< 2.00	U	ug/L	1.00	1	08/11/2015	SV	1508063
200.8	Silver	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Thallium	< 1.00	U	ug/L	0.500	1	08/11/2015	SV	1508063
200.8	Vanadium	< 3.00	U	ug/L	2.00	1	08/11/2015	SV	1508063
2340B	Hardness	143		mg/L	2	1	08/11/2015	SV	1508062

"J" Qualifier indicates an estimated value

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW01_081015

Date / Time Sampled: 08/10/15 13:17

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-01 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	232		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	53800		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	489		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	7740		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	90.6		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1960		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	11100		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	34.4		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	42.8	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	4.81	J	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	5.93		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW02_081015

Date / Time Sampled: 08/10/15 10:36

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-04 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	771		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	35100		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	1710		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	4590		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	404		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	852	J	ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	2150		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	187		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	30.6	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	1.67		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	23.5		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	10.9		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	17.8		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW04_081015

Date / Time Sampled: 08/10/15 11:47

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-07 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	362		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	50600		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	884		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	7290		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	152		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1950		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	11000		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	80.0		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	43.0	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	7.20		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	9.17		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	3.48	J	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW05_081015

Date / Time Sampled: 08/10/15 12:37

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-10 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	218		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	51100		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	547		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	7260		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	121		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1860		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	10400		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	58.0		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	43.3	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	< 1.00	U	ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	5.26		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	5.89		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods

Station ID: GKMSW11_080915

Date / Time Sampled: 08/09/15 09:40

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-13 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
200.7	Aluminum	309		ug/L	20.0	1	08/11/2015	SV	1508070
200.7	Beryllium	< 5.00	U	ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Calcium	49200		ug/L	100	1	08/11/2015	SV	1508070
200.7	Iron	731		ug/L	100	1	08/11/2015	SV	1508070
200.7	Magnesium	5100		ug/L	100	1	08/11/2015	SV	1508070
200.7	Manganese	1660		ug/L	2.00	1	08/11/2015	SV	1508070
200.7	Potassium	1480		ug/L	250	1	08/11/2015	SV	1508070
200.7	Sodium	3340		ug/L	250	1	08/11/2015	SV	1508070
200.7	Zinc	803		ug/L	10.0	1	08/11/2015	SV	1508070
200.8	Antimony	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Arsenic	< 10.0	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Barium	35.6	J	ug/L	25.0	5	08/11/2015	SV	1508070
200.8	Cadmium	2.92		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Chromium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Cobalt	4.72		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Copper	7.37		ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Lead	12.1		ug/L	0.500	5	08/11/2015	SV	1508070
200.8	Molybdenum	< 5.00	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Nickel	2.66	J	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Selenium	< 10.0	U	ug/L	5.00	5	08/11/2015	SV	1508070
200.8	Silver	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Thallium	< 5.00	U	ug/L	2.50	5	08/11/2015	SV	1508070
200.8	Vanadium	< 15.0	U	ug/L	10.0	5	08/11/2015	SV	1508070

"J" Qualifier indicates an estimated value

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW01_081015
EPA Tag No:

Date / Time Sampled: 08/10/15 13:17
Matrix: Surface Water

Workorder: C150803
Lab Number: C150803-01 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW02_081015
EPA Tag No:

Date / Time Sampled: 08/10/15 10:36
Matrix: Surface Water

Workorder: C150803
Lab Number: C150803-04 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW04_081015
EPA Tag No:

Date / Time Sampled: 08/10/15 11:47
Matrix: Surface Water

Workorder: C150803
Lab Number: C150803-07 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW05_081015
EPA Tag No:

Date / Time Sampled: 08/10/15 12:37
Matrix: Surface Water

Workorder: C150803
Lab Number: C150803-10 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Mercury only (Total) by EPA 245.1 / 7470A Method

Station ID: GKMSW11_080915

Date / Time Sampled: 08/09/15 09:40

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-13 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
245.1	Mercury	< 0.100	U	ug/L	0.0500	1	08/11/2015	NP	1508071

"J" Qualifier indicates an estimated value

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW01_081015

Date / Time Sampled: 08/10/15 13:17

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-03 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
150.1	pH	7.56		pH Units		1	08/11/2015	SW	1508067
EPA 310.1	Total Alkalinity	82.4		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW02_081015

Date / Time Sampled: 08/10/15 10:36

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-06 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
150.1	pH	7.51		pH Units		1	08/11/2015	SW	1508067
EPA 310.1	Total Alkalinity	36.2		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW04_081015

Date / Time Sampled: 08/10/15 11:47

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-09 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
150.1	pH	7.15		pH Units		1	08/11/2015	SW	1508067
EPA 310.1	Total Alkalinity	80.7		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW05_081015

Date / Time Sampled: 08/10/15 12:37

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-12 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
150.1	pH	7.19		pH Units		1	08/11/2015	SW	1508067
EPA 310.1	Total Alkalinity	81.8		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

Classical Chemistry by EPA/ASTM/APHA Methods

Station ID: GKMSW11_080915

Date / Time Sampled: 08/09/15 09:40

Workorder: C150803

EPA Tag No:

Matrix: Surface Water

Lab Number: C150803-15 A

Method	Parameter	Results	Qualifier	Units	MDL	Dilution Factor	Analyzed	By	Batch
150.1	pH	6.69		pH Units		1	08/11/2015	SW	1508067
EPA 310.1	Total Alkalinity	12.4		mg CaCO3 / L	5.00	1	08/11/2015	SW	1508066

"J" Qualifier indicates an estimated value

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
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ICPMS-PE DRC-II

Batch 1508063 - No Lab Prep Req'd

Water

ICPMS-PE DRC-II

Method Blank (1508063-BLK1)	Dilution Factor: 1	Prepared & Analyzed: 08/11/15
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Vanadium	< 2.00	3.00	ug/L
Chromium	< 1.00	2.00	"
Cobalt	< 0.100	0.200	"
Nickel	< 0.500	1.00	"
Copper	< 0.500	1.00	"
Arsenic	< 0.500	2.00	"
Selenium	< 1.00	2.00	"
Molybdenum	< 1.00	1.00	"
Silver	< 0.500	1.00	"
Cadmium	< 0.100	0.200	"
Antimony	< 0.500	1.00	"
Barium	< 5.00	10.0	"
Thallium	< 0.500	1.00	"
Lead	< 0.100	0.200	"

Method Blank Spike (1508063-BS1)	Dilution Factor: 1	Prepared & Analyzed: 08/11/15
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Vanadium	96.1	3.00	ug/L	100	96	85-115
Chromium	95.5	2.00	"	100	96	85-115
Cobalt	94.3	0.200	"	100	94	85-115
Nickel	95.0	1.00	"	100	95	85-115
Copper	94.0	1.00	"	100	94	85-115
Arsenic	92.6	2.00	"	100	93	85-115
Selenium	491	2.00	"	500	98	85-115
Molybdenum	93.3	1.00	"	100	93	85-115
Silver	93.9	1.00	"	100	94	85-115
Cadmium	95.5	0.200	"	100	96	85-115
Antimony	97.6	1.00	"	100	98	85-115
Barium	97.6	10.0	"	100	98	85-115
Thallium	96.2	1.00	"	100	96	85-115
Lead	94.9	0.200	"	100	95	85-115

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Batch 1508063 - No Lab Prep Req'd				Water		ICPMS-PE DRC-II			
Duplicate (1508063-DUP1)		Dilution Factor: 1		Source: C150803-02		Prepared & Analyzed: 08/11/15			
Vanadium	< 2.00	3.00	ug/L		< 2.00				20
Chromium	4.07	2.00	"		3.92			4	20
Cobalt	0.238	0.200	"		0.276			15	20
Nickel	< 0.500	1.00	"		< 0.500				20
Copper	1.92	1.00	"		1.87			3	20
Arsenic	< 0.500	2.00	"		< 0.500				20
Selenium	< 1.00	2.00	"		< 1.00				20
Molybdenum	< 1.00	1.00	"		< 1.00				20
Silver	< 0.500	1.00	"		< 0.500				20
Cadmium	< 0.100	0.200	"		< 0.100				20
Antimony	< 0.500	1.00	"		< 0.500				20
Barium	42.3	10.0	"		41.9			1	20
Thallium	< 0.500	1.00	"		< 0.500				20
Lead	< 0.100	0.200	"		< 0.100				20
Matrix Spike (1508063-MS1)		Dilution Factor: 1		Source: C150803-02		Prepared & Analyzed: 08/11/15			
Vanadium	94.3	3.00	ug/L	100	< 2.00	94	70-130		
Chromium	94.5	2.00	"	100	3.92	91	70-130		
Cobalt	89.9	0.200	"	100	0.276	90	70-130		
Nickel	87.9	1.00	"	100	< 0.500	88	70-130		
Copper	90.9	1.00	"	100	1.87	89	70-130		
Arsenic	101	2.00	"	100	< 0.500	101	70-130		
Selenium	543	2.00	"	500	< 1.00	109	70-130		
Molybdenum	94.8	1.00	"	100	< 1.00	95	70-130		
Silver	88.6	1.00	"	100	< 0.500	89	70-130		
Cadmium	96.1	0.200	"	100	< 0.100	96	70-130		
Antimony	101	1.00	"	100	< 0.500	101	70-130		
Barium	138	10.0	"	100	41.9	96	70-130		
Thallium	93.4	1.00	"	100	< 0.500	93	70-130		
Lead	92.4	0.200	"	100	< 0.100	92	70-130		

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Batch 1508069 - 1508063			Water				ICPMS-PE DRC-II		
Serial Dilution (1508069-SRD1)		Dilution Factor: 5		Source: C150803-02		Prepared & Analyzed: 08/11/15			
Vanadium	< 10.0	15.0	ug/L		< 2.00				10
Chromium	< 5.00	10.0	"		3.92				10
Cobalt	< 0.500	1.00	"		0.276				10
Nickel	< 2.50	5.00	"		< 0.50				10
Copper	< 2.50	5.00	"		1.87				10
Arsenic	< 2.50	10.0	"		< 0.50				10
Selenium	< 5.00	10.0	"		< 1.00				10
Molybdenum	< 5.00	5.00	"		< 1.00				10
Silver	< 2.50	5.00	"		< 0.50				10
Cadmium	< 0.500	1.00	"		< 0.10				10
Antimony	< 2.50	5.00	"		< 0.50				10
Barium	41.1	50.0	"		41.9			2	10
Thallium	< 2.50	5.00	"		< 0.50				10
Lead	< 0.500	1.00	"		< 0.10				10

ICPOE - PE Optima

Batch 1508062 - No Lab Prep Req'd			Water	ICPOE - PE Optima
Method Blank (1508062-BLK1)		Dilution Factor: 1		Prepared & Analyzed: 08/11/15
Aluminum	< 20.0	50.0	ug/L	
Beryllium	< 2.00	5.00	"	
Calcium	< 100	250	"	
Iron	< 100	250	"	
Potassium	< 250	1000	"	
Magnesium	< 100	250	"	
Manganese	< 2.00	5.00	"	
Sodium	< 250	1000	"	
Zinc	< 10.0	20.0	"	

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit
Batch 1508062 - No Lab Prep Req'd				Water		ICPOE - PE Optima			
Method Blank Spike (1508062-BS1)		Dilution Factor: 1			Prepared & Analyzed: 08/11/15				
Aluminum	10130	50.0	ug/L	10100		100	85-115		
Beryllium	99.41	5.00	"	100		99	85-115		
Calcium	10080	250	"	10100		100	85-115		
Iron	10150	250	"	10100		100	85-115		
Potassium	10300	1000	"	10100		102	85-115		
Magnesium	10140	250	"	10100		100	85-115		
Manganese	98.18	5.00	"	100		98	85-115		
Sodium	10170	1000	"	10100		101	85-115		
Zinc	102.1	20.0	"	100		102	85-115		
Duplicate (1508062-DUP1)		Dilution Factor: 1		Source: C150803-02		Prepared & Analyzed: 08/11/15			
Aluminum	71.30	50.0	ug/L		91.31			25	20
Beryllium	< 2.00	5.00	"		< 2.00				20
Calcium	51750	250	"		51470			0.5	20
Iron	< 100	250	"		< 100				20
Potassium	1902	1000	"		1878			1	20
Magnesium	7562	250	"		7559			0.05	20
Manganese	68.39	5.00	"		67.80			0.9	20
Sodium	10660	1000	"		10670			0.2	20
Zinc	< 10.0	20.0	"		< 10.0				20
Matrix Spike (1508062-MS1)		Dilution Factor: 1		Source: C150803-02		Prepared & Analyzed: 08/11/15			
Aluminum	10110	50.0	ug/L	10100	91.31	99	70-130		
Beryllium	98.84	5.00	"	100	< 2.00	99	70-130		
Calcium	60080	250	"	10100	51470	85	70-130		
Iron	10050	250	"	10100	< 100	99	70-130		
Potassium	12080	1000	"	10100	1878	101	70-130		
Magnesium	17280	250	"	10100	7559	96	70-130		
Manganese	164.7	5.00	"	100	67.80	97	70-130		
Sodium	20560	1000	"	10100	10670	98	70-130		
Zinc	104.2	20.0	"	100	< 10.0	104	70-130		

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Dissolved) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit
Batch 1508068 - 1508062			Water				ICPOE - PE Optima		
Serial Dilution (1508068-SRD1)		Dilution Factor: 5		Source: C150803-02		Prepared & Analyzed: 08/11/15			
Aluminum	< 100	250	ug/L		91.31				10
Beryllium	< 10.0	25.0	"		< 2.00				10
Calcium	50400	1250	"		51470			2	10
Iron	< 500	1250	"		< 100.00				10
Potassium	1866	5000	"		1878			0.6	10
Magnesium	7406	1250	"		7559			2	10
Manganese	67.26	25.0	"		67.80			0.8	10
Sodium	10490	5000	"		10670			2	10
Zinc	< 50.0	100	"		< 10.00				10

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.
RPD = Relative Percent Difference %D = % Difference. DL = Detection Limit for QC sample

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	% R Limits	% D or RPD	% D or RPD Limit
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ICPMS-PE DRC-II

Batch 1508070 - 200.2 - TR Metals

Water

ICPMS-PE DRC-II

Method Blank (1508070-BLK2)

Dilution Factor: 5

Prepared & Analyzed: 08/11/15

Vanadium	< 10.0	15.0	ug/L
Chromium	< 5.00	10.0	"
Cobalt	< 0.500	1.00	"
Nickel	< 2.50	5.00	"
Copper	< 2.50	5.00	"
Arsenic	< 2.50	10.0	"
Selenium	< 5.00	10.0	"
Molybdenum	< 5.00	5.00	"
Silver	< 2.50	5.00	"
Cadmium	< 0.500	1.00	"
Antimony	< 2.50	5.00	"
Barium	< 25.0	50.0	"
Thallium	< 2.50	5.00	"
Lead	< 0.500	1.00	"

Duplicate (1508070-DUP2)

Dilution Factor: 5

Source: C150803-01

Prepared & Analyzed: 08/11/15

Vanadium	< 10.0	15.0	ug/L	< 10.0		20
Chromium	< 5.00	10.0	"	< 5.00		20
Cobalt	< 0.500	1.00	"	< 0.500		20
Nickel	< 2.50	5.00	"	< 2.50		20
Copper	5.064	5.00	"	4.813	5	20
Arsenic	< 2.50	10.0	"	< 2.50		20
Selenium	< 5.00	10.0	"	< 5.00		20
Molybdenum	< 5.00	5.00	"	< 5.00		20
Silver	< 2.50	5.00	"	< 2.50		20
Cadmium	< 0.500	1.00	"	< 0.500		20
Antimony	< 2.50	5.00	"	< 2.50		20
Barium	41.15	50.0	"	42.77	4	20
Thallium	< 2.50	5.00	"	< 2.50		20
Lead	6.562	1.00	"	5.929	10	20

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

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TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	% R Limits	% D or RPD	% D or RPD Limit
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Batch 1508070 - 200.2 - TR Metals

Water

ICPMS-PE DRC-II

Matrix Spike (1508070-MS2)

Dilution Factor: 5

Source: C150803-01

Prepared & Analyzed: 08/11/15

Vanadium	283.8	15.0	ug/L	300	< 10.0	95	70-130		
Chromium	378.8	10.0	"	400	< 5.00	95	70-130		
Cobalt	184.6	1.00	"	200	< 0.500	92	70-130		
Nickel	458.8	5.00	"	500	< 2.50	92	70-130		
Copper	337.0	5.00	"	300	4.813	111	70-130		
Arsenic	753.7	10.0	"	800	< 2.50	94	70-130		
Selenium	1884	10.0	"	2000	< 5.00	94	70-130		
Molybdenum	370.5	5.00	"	400	< 5.00	93	70-130		
Silver	68.95	5.00	"	75.0	< 2.50	92	70-130		
Cadmium	184.9	1.00	"	200	< 0.500	92	70-130		
Antimony	775.0	5.00	"	800	< 2.50	97	70-130		
Barium	223.0	50.0	"	200	42.77	90	70-130		
Thallium	1784	5.00	"	2000	< 2.50	89	70-130		
Lead	921.3	1.00	"	1000	5.929	92	70-130		

Reference (1508070-SRM2)

Dilution Factor: 2

Prepared & Analyzed: 08/11/15

Vanadium	929.7	60.0	ug/L	1000		93	85-115		
Chromium	945.6	40.0	"	1000		95	85-115		
Cobalt	933.9	4.00	"	1000		93	85-115		
Nickel	920.0	20.0	"	1000		92	85-115		
Copper	951.7	20.0	"	1000		95	85-115		
Arsenic	2042	40.0	"	2000		102	85-115		
Selenium	987.3	40.0	"	1000		99	85-115		
Molybdenum	899.4	20.0	"	1000		90	85-115		
Silver	239.2	20.0	"	250		96	85-115		
Cadmium	931.3	4.00	"	1000		93	85-115		
Antimony	1918	20.0	"	2000		96	85-115		
Barium	920.7	200	"	1000		92	85-115		
Thallium	4590	20.0	"	5000		92	85-115		
Lead	1880	4.00	"	2000		94	85-115		

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Batch 1508077 - 1508070			Water				ICPMS-PE DRC-II		
Serial Dilution (1508077-SRD1)		Dilution Factor: 2		Source: C150803-01		Prepared & Analyzed: 08/11/15			
Vanadium	< 50.0	75.0	ug/L		< 10.00				10
Chromium	< 25.0	50.0	"		< 5.00				10
Cobalt	< 2.50	5.00	"		< 0.50				10
Nickel	< 12.5	25.0	"		< 2.50				10
Copper	< 12.5	25.0	"		4.813				10
Arsenic	< 12.5	50.0	"		< 2.50				10
Selenium	< 25.0	50.0	"		< 5.00				10
Molybdenum	< 25.0	25.0	"		< 5.00				200
Silver	< 12.5	25.0	"		< 2.50				10
Cadmium	< 2.50	5.00	"		< 0.50				10
Antimony	< 12.5	25.0	"		< 2.50				10
Barium	< 125	250	"		42.77				10
Thallium	< 12.5	25.0	"		< 2.50				10
Lead	5.082	5.00	"		5.929			15	10

ICPOE - PE Optima

Batch 1508070 - 200.2 - TR Metals			Water	ICPOE - PE Optima
Method Blank (1508070-BLK1)		Dilution Factor: 1		Prepared & Analyzed: 08/11/15
Aluminum	< 20.0	50.0	ug/L	
Beryllium	< 2.00	5.00	"	
Calcium	< 100	250	"	
Iron	< 100	250	"	
Potassium	< 250	1000	"	
Magnesium	< 100	250	"	
Manganese	6.774	5.00	"	
Sodium	< 250	1000	"	
Zinc	< 10.0	20.0	"	

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit
Batch 1508070 - 200.2 - TR Metals			Water				ICPOE - PE Optima		
Duplicate (1508070-DUP1)		Dilution Factor: 1	Source: C150803-01			Prepared & Analyzed: 08/11/15			
Aluminum	242.2	50.0	ug/L		232.1			4	20
Beryllium	< 2.00	5.00	"		< 2.00				20
Calcium	53060	250	"		53850			1	20
Iron	495.0	250	"		489.3			1	20
Potassium	1968	1000	"		1957			0.6	20
Magnesium	7704	250	"		7740			0.5	20
Manganese	91.32	5.00	"		90.63			0.8	20
Sodium	10910	1000	"		11070			1	20
Zinc	34.82	20.0	"		34.41			1	20
Matrix Spike (1508070-MS1)		Dilution Factor: 1	Source: C150803-01			Prepared & Analyzed: 08/11/15			
Aluminum	2303	50.0	ug/L	2000	232.1	104	70-130		
Beryllium	201.9	5.00	"	200	< 2.00	101	70-130		
Calcium	54750	250	"	1000	53850	91	70-130		
Iron	3598	250	"	3000	489.3	104	70-130		
Potassium	12210	1000	"	10000	1957	103	70-130		
Magnesium	9919	250	"	2000	7740	109	70-130		
Manganese	296.9	5.00	"	200	90.63	103	70-130		
Sodium	14130	1000	"	3000	11070	102	70-130		
Zinc	238.1	20.0	"	200	34.41	102	70-130		
Reference (1508070-SRM1)		Dilution Factor: 1				Prepared & Analyzed: 08/11/15			
Aluminum	998.2	50.0	ug/L	1000		100	85-115		
Beryllium	979.5	5.00	"	1000		98	85-115		
Calcium	976.7	250	"	1000		98	85-115		
Iron	986.5	250	"	1000		99	85-115		
Potassium	4933	1000	"	5000		99	85-115		
Magnesium	975.6	250	"	1000		98	85-115		
Manganese	1005	5.00	"	1000		101	85-115		
Sodium	992.2	1000	"	1000		99	85-115		
Zinc	998.1	20.0	"	1000		100	85-115		

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Metals (Total Recov) by EPA 200/7000 Series Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	%R	%R Limits	%D or RPD	%D or RPD Limit
Batch 1508078 - 1508070			Water				ICPOE - PE Optima		
Serial Dilution (1508078-SRD1)		Dilution Factor: 5		Source: C150803-01		Prepared & Analyzed: 08/11/15			
Aluminum	236.4	250	ug/L		232.1			2	10
Beryllium	< 10.0	25.0	"		< 2.00				10
Calcium	52870	1250	"		53850			2	10
Iron	619.8	1250	"		489.3			24	10
Potassium	1933	5000	"		1957			1	10
Magnesium	7701	1250	"		7740			0.5	10
Manganese	91.33	25.0	"		90.63			0.8	10
Sodium	11060	5000	"		11070			0.1	10
Zinc	53.43	100	"		34.41			43	10

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.
RPD = Relative Percent Difference %D = % Difference. DL = Detection Limit for QC sample

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Mercury only (Total) by EPA 245.1 / 7470A Method - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
CVAA FIMS - PE									
Batch 1508071 - EPA 245.1/245.2 Prep			Water				CVAA FIMS - PE		
Method Blank (1508071-BLK1)		Dilution Factor: 1			Prepared & Analyzed: 08/11/15				
Mercury	< 0.0500	0.100	ug/L						
Method Blank Spike (1508071-BS1)		Dilution Factor: 1			Prepared & Analyzed: 08/11/15				
Mercury	8.14	0.100	ug/L	7.50		109	85-115		
Duplicate (1508071-DUP1)		Dilution Factor: 1			Source: C150803-01		Prepared & Analyzed: 08/11/15		
Mercury	< 0.0500	0.100	ug/L		< 0.0500				20
Matrix Spike (1508071-MS1)		Dilution Factor: 1			Source: C150803-01		Prepared & Analyzed: 08/11/15		
Mercury	8.07	0.100	ug/L	7.50	< 0.0500	108	75-125		
Batch 1508072 - 1508071			Water				CVAA FIMS - PE		
Instrument Blank (1508072-IBL1)		Dilution Factor: 1			Prepared & Analyzed: 08/11/15				
Mercury	< 0.0500	0.100	ug/L						

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.
 RPD = Relative Percent Difference %D = % Difference, DL = Detection Limit for QC sample

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

Classical Chemistry by EPA/ASTM/APHA Methods - Quality Control

TechLaw, Inc. - ESAT Region 8

Analyte	Result	Det. Limit	Units	Spike Level	Source Result	% R	% R Limits	% D or RPD	% D or RPD Limit
Mettler AT									
Batch 1508066 - No Prep Req			Water				Mettler AT		
Method Blank (1508066-BLK1)		Dilution Factor: 1				Prepared & Analyzed: 08/11/15			
Total Alkalinity	< 5.00	10.0	mg CaCO3 / L						
Duplicate (1508066-DUP1)		Dilution Factor: 1		Source: C150803-03		Prepared & Analyzed: 08/11/15			
Total Alkalinity	81.9	10.0	mg CaCO3 / L		82.4			0.5	20
Reference (1508066-SRM1)		Dilution Factor: 1				Prepared & Analyzed: 08/11/15			
Total Alkalinity	77.2	10.0	mg CaCO3 / L	78.1		99	88.7-111.3		

NOTE: %R = % Recovery, %R limits do not apply when sample levels exceed 4x the spike level.
RPD = Relative Percent Difference %D = % Difference, DL = Detection Limit for QC sample

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
 Intial and Continuing Calibration Blanks

Analytical Method: 200.7

Analysis Name: ICPOE Diss. Metals

Instrument: ICPOE - PE Optima

Work Order: Nu C150803

Analytical Sequence: 1508068 Dissolved

Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Aluminum	3.10	1	2	3	4	1508062-BLK1	NA	50.00
		2.48				4.98	NA	
		5	6	7	8			
Beryllium	0.18	1	2	3	4	1508062-BLK1	NA	5.00
		0.08				0.02	NA	
		5	6	7	8			
Calcium	-0.03	1	2	3	4	1508062-BLK1	NA	250.00
		4.51				4.30	NA	
		5	6	7	8			
Iron	4.65	1	2	3	4	1508062-BLK1	NA	250.00
		26.07				49.09	NA	
		5	6	7	8			
Potassium	20.43	1	2	3	4	1508062-BLK1	NA	1,000.00
		45.20				15.79	NA	
		5	6	7	8			
Magnesium	-0.01	1	2	3	4	1508062-BLK1	NA	250.00
		1.24				4.62	NA	
		5	6	7	8			
Manganese	0.06	1	2	3	4	1508062-BLK1	NA	5.00
		0.09				-0.29	NA	
		5	6	7	8			
Sodium	-0.81	1	2	3	4	1508062-BLK1	NA	1,000.00
		-0.40				8.89	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: 200.7 Analysis Name: ICPOE Diss. Metals

Instrument: ICPOE - PE Optima Work Order: Nu C150803

Analytical Sequence: 1508068 **Dissolved** Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Zinc	1.21	1	2	3	4	1508062-BLK1	NA	20.00
		1.32				-0.74	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
 Intial and Continuing Calibration Blanks

Analytical Method: 200.8

Analysis Name: ICPMS Diss. Metals

Instrument: ICPMS-PE DRC-II

Work Order: Nu C150803

Analytical Sequence: 1508069 Dissolved

Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Vanadium	-0.02	1	2	3	4	1508063-BLK1	NA	3.00
		0.06				-0.11	NA	
		5	6	7	8			
Chromium	-0.05	1	2	3	4	1508063-BLK1	NA	2.00
		-0.03				-0.05	NA	
		5	6	7	8			
Cobalt	0.02	1	2	3	4	1508063-BLK1	NA	0.20
		0.01				-0.03	NA	
		5	6	7	8			
Nickel	-0.01	1	2	3	4	1508063-BLK1	NA	1.00
		0.00				-0.06	NA	
		5	6	7	8			
Copper	0.02	1	2	3	4	1508063-BLK1	NA	1.00
		0.07				-0.06	NA	
		5	6	7	8			
Arsenic	-0.15	1	2	3	4	1508063-BLK1	NA	2.00
		0.00				-0.01	NA	
		5	6	7	8			
Selenium	0.03	1	2	3	4	1508063-BLK1	NA	2.00
		-0.12				0.18	NA	
		5	6	7	8			
Molybdenum	0.04	1	2	3	4	1508063-BLK1	NA	1.00
		0.03				-0.01	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

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TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
 Intial and Continuing Calibration Blanks

Analytical Method: 200.8Analysis Name: ICPMS Diss. MetalsInstrument: ICPMS-PE DRC-IIWork Order: Nu C150803Analytical Sequence: 1508069 **Dissolved**Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Silver	0.03	1	2	3	4	1508063-BLK1	NA	1.00
		0.03				-0.02	NA	
		5	6	7	8			
Cadmium	0.01	1	2	3	4	1508063-BLK1	NA	0.20
		0.02				-0.03	NA	
		5	6	7	8			
Antimony	0.13	1	2	3	4	1508063-BLK1	NA	1.00
		0.21				-0.04	NA	
		5	6	7	8			
Barium	0.02	1	2	3	4	1508063-BLK1	NA	10.00
		0.01				-0.04	NA	
		5	6	7	8			
Thallium	0.01	1	2	3	4	1508063-BLK1	NA	1.00
		-0.01				-0.10	NA	
		5	6	7	8			
Lead	0.01	1	2	3	4	1508063-BLK1	NA	0.20
		0.00				-0.05	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: 245.1 Analysis Name: TM Mercury 245.1

Instrument: CVAA FIMS - PE Work Order: Nu C150803

Analytical Sequence: 1508072 **Total** Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Mercury	0.00	1	2	3	4	1508071-BLK1	NA	0.10
		0.01				0.00	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: EPA 310.1

Analysis Name: WC - Alkalinity

Instrument: Mettler AT

Work Order: Nu C150803

Analytical Sequence: **Total**

Concentration Units: mg CaCO3 / L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Total Alkalinity		1	2	3	4	1508066-BLK1	NA	10.00
		1.25				0.87	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
 Intial and Continuing Calibration Blanks

Analytical Method: 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Instrument: ICPMS-PE DRC-II

Work Order: Nu C150803

Analytical Sequence: 1508077 Total Recoverable

Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Vanadium	-0.02	1	2	3	4	NA	1508070-BLK2	3.00
		0.06	-0.01			NA	0.01	
		5	6	7	8			
Chromium	-0.05	1	2	3	4	NA	1508070-BLK2	2.00
		-0.03	-0.06			NA	0.27	
		5	6	7	8			
Cobalt	0.02	1	2	3	4	NA	1508070-BLK2	0.20
		0.01	0.00			NA	-0.03	
		5	6	7	8			
Nickel	-0.01	1	2	3	4	NA	1508070-BLK2	1.00
		0.00	0.00			NA	-0.06	
		5	6	7	8			
Copper	0.02	1	2	3	4	NA	1508070-BLK2	1.00
		0.07	0.02			NA	-0.03	
		5	6	7	8			
Arsenic	-0.15	1	2	3	4	NA	1508070-BLK2	2.00
		0.00	-0.11			NA	-0.08	
		5	6	7	8			
Selenium	0.03	1	2	3	4	NA	1508070-BLK2	2.00
		-0.12	0.18			NA	-0.04	
		5	6	7	8			
Molybdenum	0.04	1	2	3	4	NA	1508070-BLK2	1.00
		0.03	0.02			NA	-0.04	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
 Intial and Continuing Calibration Blanks

Analytical Method: 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Instrument: ICPMS-PE DRC-II

Work Order: Nu C150803

Analytical Sequence: 1508077 Total Recoverable

Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Silver	0.03	1	2	3	4	NA	1508070-BLK2	1.00
		0.03	0.02			NA	-0.03	
		5	6	7	8			
Cadmium	0.01	1	2	3	4	NA	1508070-BLK2	0.20
		0.02	0.01			NA	-0.04	
		5	6	7	8			
Antimony	0.13	1	2	3	4	NA	1508070-BLK2	1.00
		0.21	0.21			NA	-0.03	
		5	6	7	8			
Barium	0.02	1	2	3	4	NA	1508070-BLK2	10.00
		0.01	0.00			NA	-0.05	
		5	6	7	8			
Thallium	0.01	1	2	3	4	NA	1508070-BLK2	1.00
		-0.01	0.13			NA	-0.11	
		5	6	7	8			
Lead	0.01	1	2	3	4	NA	1508070-BLK2	0.20
		0.00	0.00			NA	-0.04	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
 Intial and Continuing Calibration Blanks

Analytical Method: 200.7

Analysis Name: ICPOE Tot. Rec. Metals

Instrument: ICPOE - PE Optima

Work Order: Nu C150803

Analytical Sequence: 1508078 Total Recoverable

Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Aluminum	3.10	1	2	3	4	1508070-BLK1	NA	50.00
		2.48	3.18			1.47	NA	
		5	6	7	8			
Beryllium	0.18	1	2	3	4	1508070-BLK1	NA	5.00
		0.08	0.10			0.02	NA	
		5	6	7	8			
Calcium	-0.03	1	2	3	4	1508070-BLK1	NA	250.00
		4.51	3.74			-2.20	NA	
		5	6	7	8			
Iron	4.65	1	2	3	4	1508070-BLK1	NA	250.00
		26.07	24.54			-11.66	NA	
		5	6	7	8			
Potassium	20.43	1	2	3	4	1508070-BLK1	NA	1,000.00
		45.20	52.95			27.12	NA	
		5	6	7	8			
Magnesium	-0.01	1	2	3	4	1508070-BLK1	NA	250.00
		1.24	2.09			-5.66	NA	
		5	6	7	8			
Manganese	0.06	1	2	3	4	1508070-BLK1	NA	5.00
		0.09	0.07			6.77	NA	
		5	6	7	8			
Sodium	-0.81	1	2	3	4	1508070-BLK1	NA	1,000.00
		-0.40	-4.64			15.02	NA	
		5	6	7	8			

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8
INORGANIC ANALYSES DATA SHEET
Intial and Continuing Calibration Blanks

Analytical Method: 200.7 Analysis Name: ICPOE Tot. Rec. Metals

Instrument: ICPOE - PE Optima Work Order: Nu C150803

Analytical Sequence: 1508078 **Total Recoverable** Concentration Units: ug/L

Blank criteria = +/- 5x analyte MDL (+/- PQL)

Analyte	Initial Calibration Blank (1 & 2)	Continuing Calibration Blanks				Method Blank (Batch ID)		PQL
Zinc	1.21	1	2	3	4	1508070-BLK1	NA	20.00
		1.32	1.04			2.24	NA	
		5	6	7	8			

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: 200.7

Analysis Name: ICPOE Diss. Metals

Sequence: 1508068

Work Order: C150803

Units: ug/L

Dissolved Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Aluminum	12500	12560	100.5		1			2			3	
				12500	12430	99.4						
					4			5			6	
					7			8			9	
Beryllium	500	506.0	101.2		1			2			3	
				500	503.0	100.6						
					4			5			6	
					7			8			9	
Calcium	12500	12610	100.9		1			2			3	
				12500	12570	100.6						
					4			5			6	
					7			8			9	
Iron	12500	12740	101.9		1			2			3	
				12500	12670	101.4						
					4			5			6	
					7			8			9	
Magnesium	12500	12650	101.2		1			2			3	
				12500	12570	100.6						
					4			5			6	
					7			8			9	
Manganese	1000	1022	102.2		1			2			3	
				1000	1025	102.5						
					4			5			6	
					7			8			9	

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: 200.7

Analysis Name: ICPOE Diss. Metals

Sequence: 1508068

Work Order: C150803

Units: ug/L

Dissolved Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Potassium	25000	25050	100.2		1			2			3	
				25000	24810	99.2						
					4			5			6	
					7			8			9	
Sodium	12500	12530	100.2		1			2			3	
				12500	12460	99.7						
					4			5			6	
					7			8			9	
Zinc	2500	2559	102.4		1			2			3	
				2500	2581	103.2						
					4			5			6	
					7			8			9	

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: 200.8

Analysis Name: ICPMS Diss. Metals

Sequence: 1508069

Work Order: C150803

Units: ug/L

Dissolved Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Antimony	50.0	49.3	98.6		1			2			3	
				50.0	49.3	98.6						
					4			5			6	
					7			8			9	
Arsenic	50.0	49.6	99.2		1			2			3	
				50.0	50.9	101.8						
					4			5			6	
					7			8			9	
Barium	50.0	50.1	100.2		1			2			3	
				50.0	50.8	101.6						
					4			5			6	
					7			8			9	
Cadmium	50.0	48.7	97.4		1			2			3	
				50.0	49.5	99.0						
					4			5			6	
					7			8			9	
Chromium	50.0	50.9	101.8		1			2			3	
				50.0	51.3	102.6						
					4			5			6	
					7			8			9	
Cobalt	50.0	49.0	98.0		1			2			3	
				50.0	52.0	104.0						
					4			5			6	
					7			8			9	

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: 200.8

Analysis Name: ICPMS Diss. Metals

Sequence: 1508069

Work Order: C150803

Units: ug/L

Dissolved Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Copper	50.0	51.0	102.0		1			2			3	
				50.0	51.4	102.8						
					4			5			6	
					7			8			9	
Lead	50.0	49.8	99.6		1			2			3	
				50.0	49.8	99.6						
					4			5			6	
					7			8			9	
Molybdenum	50.0	49.0	98.0		1			2			3	
				50.0	49.6	99.2						
					4			5			6	
					7			8			9	
Nickel	50.0	50.2	100.4		1			2			3	
				50.0	51.4	102.8						
					4			5			6	
					7			8			9	
Selenium	50.0	48.0	96.0		1			2			3	
				50.0	49.9	99.8						
					4			5			6	
					7			8			9	
Silver	50.0	49.8	99.6		1			2			3	
				50.0	49.9	99.8						
					4			5			6	
					7			8			9	

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: 200.8

Analysis Name: ICPMS Diss. Metals

Sequence: 1508069

Work Order: C150803

Units: ug/L

Dissolved Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Thallium	50.0	49.1	98.2		1			2			3	
				50.0	50.0	100.0						
					4			5			6	
					7			8			9	
Vanadium	50.0	49.7	99.4		1			2			3	
				50.0	50.6	101.2						
					4			5			6	
					7			8			9	

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

CVAA FIMS - PE

Method: 245.1

Analysis Name: TM_Mercury 245.1

Sequence: 1508072

Work Order: C150803

Units: ug/L

Total Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)										
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R		
Mercury	5.00	5.26	105.2	1			2			3				
				5.00	5.08	101.6								
				4			5			6				
				7			8			9				

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

pH Meter

Method: 150.1

Analysis Name: WC-pH

Sequence: 1508073

Work Order: C150803

Units: pH Units

WET Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
pH				1			2			3		
				4			5			6		
				7			8			9		

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

Mettler AT

Method: EPA 310.1

Analysis Name: WC - Alkalinity

Sequence: 1508074

Work Order: C150803

Units: mg CaCO₃ / L

Total Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Total Alkalinity				1			2			3		
				100	98.8	98.8						
				4			5			6		
				7			8			9		

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508077

Work Order: C150803

Units: ug/L

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Antimony	50.0	49.26	98.5		1			2			3	
				50.0	49.30	98.6	50.0	46.19	92.4			
					4			5			6	
					7			8			9	
Arsenic	50.0	49.60	99.2		1			2			3	
				50.0	50.88	101.8	50.0	49.12	98.2			
					4			5			6	
					7			8			9	
Barium	50.0	50.12	100.2		1			2			3	
				50.0	50.77	101.5	50.0	48.94	97.9			
					4			5			6	
					7			8			9	
Cadmium	50.0	48.71	97.4		1			2			3	
				50.0	49.49	99.0	50.0	47.01	94.0			
					4			5			6	
					7			8			9	
Chromium	50.0	50.88	101.8		1			2			3	
				50.0	51.31	102.6	50.0	47.71	95.4			
					4			5			6	
					7			8			9	
Cobalt	50.0	49.03	98.1		1			2			3	
				50.0	51.98	104.0	50.0	47.42	94.8			
					4			5			6	
					7			8			9	

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508077

Work Order: C150803

Units: ug/L

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Copper	50.0	51.00	102.0		1			2			3	
				50.0	51.38	102.8	50.0	47.09	94.2			
					4			5			6	
					7			8			9	
Lead	50.0	49.76	99.5		1			2			3	
				50.0	49.84	99.7	50.0	47.34	94.7			
					4			5			6	
					7			8			9	
Molybdenum	50.0	49.00	98.0		1			2			3	
				50.0	49.61	99.2	50.0	46.98	94.0			
					4			5			6	
					7			8			9	
Nickel	50.0	50.16	100.3		1			2			3	
				50.0	51.39	102.8	50.0	47.33	94.7			
					4			5			6	
					7			8			9	
Selenium	50.0	48.04	96.1		1			2			3	
				50.0	49.95	99.9	50.0	48.11	96.2			
					4			5			6	
					7			8			9	
Silver	50.0	49.82	99.6		1			2			3	
				50.0	49.88	99.8	50.0	46.27	92.5			
					4			5			6	
					7			8			9	

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPMS-PE DRC-II

Method: 200.8

Analysis Name: ICPMS Tot. Rec. Metals

Sequence: 1508077

Work Order: C150803

Units: ug/L

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Thallium	50.0	49.09	98.2	1			2			3		
				50.0	49.95	99.9	50.0	48.08	96.2			
				4			5			6		
		7			8			9				
Vanadium	50.0	49.70	99.4	1			2			3		
				50.0	50.56	101.1	50.0	47.91	95.8			
				4			5			6		
		7			8			9				

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: 200.7

Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508078

Work Order: C150803

Units: ug/L

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Aluminum	12500	12560	100.5		1			2			3	
				12500	12430	99.4	12500	11960	95.7			
					4			5			6	
					7			8			9	
Beryllium	500	506.0	101.2		1			2			3	
				500	503.0	100.6	500	492.1	98.4			
					4			5			6	
					7			8			9	
Calcium	12500	12610	100.9		1			2			3	
				12500	12570	100.6	12500	11950	95.6			
					4			5			6	
					7			8			9	
Iron	12500	12740	101.9		1			2			3	
				12500	12670	101.4	12500	11980	95.8			
					4			5			6	
					7			8			9	
Magnesium	12500	12650	101.2		1			2			3	
				12500	12570	100.6	12500	12010	96.1			
					4			5			6	
					7			8			9	
Manganese	1000	1022	102.2		1			2			3	
				1000	1025	102.5	1000	994.0	99.4			
					4			5			6	
					7			8			9	

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

Initial and Continuing Calibration Verification Results

ICPOE - PE Optima

Method: 200.7

Analysis Name: ICPOE Tot. Rec. Metals

Sequence: 1508078

Work Order: C150803

Units: ug/L

Total Recoverable Analyte	Initial (ICV1, ICV2)			Continuing Calibration Verification Standards (CCVs)								
	True	Found	%R	True	Found	%R	True	Found	%R	True	Found	%R
Potassium	25000	25050	100.2	1			2			3		
				25000	24810	99.2	25000	23930	95.7			
				4			5			6		
		7			8			9				
Sodium	12500	12530	100.2	1			2			3		
				12500	12460	99.7	12500	12040	96.3			
				4			5			6		
		7			8			9				
Zinc	2500	2559	102.4	1			2			3		
				2500	2581	103.2	2500	2462	98.5			
				4			5			6		
		7			8			9				

Metals - ICV & CCV %R Criteria = 90 - 110%, Classical Chemistry %R Criteria -ICV = 90 - 110%R, CCV = 80 - 120%R.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

ICP Interference Check Sample

ICPMS-PE DRC-II

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508069	Analysis: ICPMS Diss. Metals					
Antimony	IFA1	0.0	ug/L			1.00
	IFB1	0.0	ug/L			1.00
Arsenic	IFA1	0.0	ug/L			2.00
	IFB1	20.8	ug/L	20	104	2.00
Barium	IFA1	0.0	ug/L			10.0
	IFB1	0.1	ug/L			10.0
Cadmium	IFA1	0.0	ug/L			0.200
	IFB1	19.7	ug/L	20	99	0.200
Chromium	IFA1	0.1	ug/L			2.00
	IFB1	21.1	ug/L	20	105	2.00
Cobalt	IFA1	0.2	ug/L			0.200
	IFB1	20.6	ug/L	20	103	0.200
Copper	IFA1	0.7	ug/L			1.00
	IFB1	22.2	ug/L	20	111	1.00
Lead	IFA1	0.0	ug/L			0.200
	IFB1	0.0	ug/L			0.200
Molybdenum	IFA1	199.9	ug/L	200	100	1.00
	IFB1	197.7	ug/L	200	99	1.00
Nickel	IFA1	-0.2	ug/L			1.00
	IFB1	20.5	ug/L	20	103	1.00
Selenium	IFA1	-0.4	ug/L			2.00
	IFB1	-0.4	ug/L			2.00
Silver	IFA1	0.0	ug/L			1.00
	IFB1	19.6	ug/L	20	98	1.00
Thallium	IFA1	-0.1	ug/L			1.00
	IFB1	-0.1	ug/L			1.00
Vanadium	IFA1	-0.2	ug/L			3.00
	IFB1	-0.3	ug/L			3.00

*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8
ICP Interference Check Sample
ICPMS-PE DRC-II

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508077 Analysis: ICPMS Tot. Rec. Metals						
Antimony	IFA1	0.0	ug/L			1.00
	IFB1	0.0	ug/L			1.00
Arsenic	IFA1	0.0	ug/L			2.00
	IFB1	20.8	ug/L	20	104	2.00
Barium	IFA1	0.0	ug/L			10.0
	IFB1	0.1	ug/L			10.0
Cadmium	IFA1	0.0	ug/L			0.200
	IFB1	19.7	ug/L	20	99	0.200
Chromium	IFA1	0.1	ug/L			2.00
	IFB1	21.1	ug/L	20	105	2.00
Cobalt	IFA1	0.2	ug/L			0.200
	IFB1	20.6	ug/L	20	103	0.200
Copper	IFA1	0.7	ug/L			1.00
	IFB1	22.2	ug/L	20	111	1.00
Lead	IFA1	0.0	ug/L			0.200
	IFB1	0.0	ug/L			0.200
Molybdenum	IFA1	199.9	ug/L	200	100	1.00
	IFB1	197.7	ug/L	200	99	1.00
Nickel	IFA1	-0.2	ug/L			1.00
	IFB1	20.5	ug/L	20	103	1.00
Selenium	IFA1	-0.4	ug/L			2.00
	IFB1	-0.4	ug/L			2.00
Silver	IFA1	0.0	ug/L			1.00
	IFB1	19.6	ug/L	20	98	1.00
Thallium	IFA1	-0.1	ug/L			1.00
	IFB1	-0.1	ug/L			1.00
Vanadium	IFA1	-0.2	ug/L			3.00
	IFB1	-0.3	ug/L			3.00

*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

ICP Interference Check Sample

ICPOE - PE Optima

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508068 Analysis: ICPOE Diss. Metals						
Aluminum	IFA1	59,401.9	ug/L	60,000	99	50.0
	IFB1	59,982.4	ug/L	60,000	100	50.0
Beryllium	IFA1	-0.4	ug/L			5.00
	IFB1	99.6	ug/L	100	100	5.00
Calcium	IFA1	286,521.7	ug/L	300,000	96	250
	IFB1	287,344.0	ug/L	300,000	96	250
Iron	IFA1	236,042.4	ug/L	250,000	94	250
	IFB1	236,025.1	ug/L	250,000	94	250
Magnesium	IFA1	140,652.9	ug/L	150,000	94	250
	IFB1	142,177.2	ug/L	150,000	95	250
Manganese	IFA1	0.9	ug/L			5.00
	IFB1	196.6	ug/L	200	98	5.00
Potassium	IFA1	-341.8	ug/L			1000
	IFB1	20,611.2	ug/L	20,000	103	1000
Sodium	IFA1	50,577.6	ug/L	50,000	101	1000
	IFB1	50,806.4	ug/L	50,000	102	1000
Zinc	IFA1	0.1	ug/L			20.0
	IFB1	290.4	ug/L	300	97	20.0

*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8

ICP Interference Check Sample

ICPOE - PE Optima

<u>Analyte</u>	<u>Check Sample</u>	<u>Result*</u>	<u>Units</u>	<u>True</u>	<u>%R</u>	<u>PQL</u>
Sequence: 1508078 Analysis: ICPOE Tot. Rec. Metals						
Aluminum	IFA1	59,401.9	ug/L	60,000	99	50.0
	IFB1	59,982.4	ug/L	60,000	100	50.0
Beryllium	IFA1	-0.4	ug/L			5.00
	IFB1	99.6	ug/L	100	100	5.00
Calcium	IFA1	286,521.7	ug/L	300,000	96	250
	IFB1	287,344.0	ug/L	300,000	96	250
Iron	IFA1	236,042.4	ug/L	250,000	94	250
	IFB1	236,025.1	ug/L	250,000	94	250
Magnesium	IFA1	140,652.9	ug/L	150,000	94	250
	IFB1	142,177.2	ug/L	150,000	95	250
Manganese	IFA1	0.9	ug/L			5.00
	IFB1	196.6	ug/L	200	98	5.00
Potassium	IFA1	-341.8	ug/L			1000
	IFB1	20,611.2	ug/L	20,000	103	1000
Sodium	IFA1	50,577.6	ug/L	50,000	101	1000
	IFB1	50,806.4	ug/L	50,000	102	1000
Zinc	IFA1	0.1	ug/L			20.0
	IFB1	290.4	ug/L	300	97	20.0

*Criteria = 80-120%R of True Value or +/- PQL

See raw data for complete analyte list and results.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPMS-PE DRC-II				
Metals (Dissolved) by EPA 200/7000 Series Methods				
Sequence: 1508069				
Analyte	True	Found	%R	Units
Antimony	1.00	1.05	105	ug/L
Arsenic	2.00	2.04	102	ug/L
Barium	10.0	9.68	97	ug/L
Cadmium	0.200	0.206	103	ug/L
Chromium	2.00	1.79	89	ug/L
Cobalt	0.200	0.170	85	ug/L
Copper	1.00	1.01	101	ug/L
Lead	0.200	0.171	85	ug/L
Molybdenum	1.00	0.885	88	ug/L
Nickel	1.00	0.913	91	ug/L
Selenium	2.00	1.82	91	ug/L
Silver	1.00	0.956	96	ug/L
Thallium	1.00	0.891	89	ug/L
Vanadium	2.00	1.82	91	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPOE - PE Optima				
Metals (Dissolved) by EPA 200/7000 Series Methods				
Sequence: 1508068				
Analyte	True	Found	%R	Units
Aluminum	100	111.8	112	ug/L
Beryllium	5.00	5.299	106	ug/L
Calcium	250	250.3	100	ug/L
Iron	100	95.01	95	ug/L
Magnesium	1000	1037	104	ug/L
Manganese	10.0	10.65	106	ug/L
Potassium	1000	1035	104	ug/L
Sodium	1000	1042	104	ug/L
Zinc	50.0	56.42	113	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPMS-PE DRC-II				
Metals (Total Recov) by EPA 200/7000 Series Methods Sequence: 1508077				
Analyte	True	Found	%R	Units
Antimony	1.00	1.047	105	ug/L
Arsenic	2.00	2.039	102	ug/L
Barium	10.0	9.677	97	ug/L
Cadmium	0.200	0.2062	103	ug/L
Chromium	2.00	1.786	89	ug/L
Cobalt	0.200	0.1701	85	ug/L
Copper	1.00	1.011	101	ug/L
Lead	0.200	0.1705	85	ug/L
Molybdenum	1.00	0.8850	88	ug/L
Nickel	1.00	0.9126	91	ug/L
Selenium	2.00	1.817	91	ug/L
Silver	1.00	0.9558	96	ug/L
Thallium	1.00	0.8908	89	ug/L
Vanadium	2.00	1.817	91	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TDF #: A-098

TechLaw, Inc. - ESAT Region 8 Detection Limit (PQL) Standard ICPOE - PE Optima				
Metals (Total Recov) by EPA 200/7000 Series Methods				
Sequence: 1508078				
Analyte	True	Found	%R	Units
Aluminum	100	111.8	112	ug/L
Beryllium	5.00	5.299	106	ug/L
Calcium	250	250.3	100	ug/L
Iron	100	95.01	95	ug/L
Magnesium	1000	1037	104	ug/L
Manganese	10.0	10.65	106	ug/L
Potassium	1000	1035	104	ug/L
Sodium	1000	1042	104	ug/L
Zinc	50.0	56.42	113	ug/L

Recovery Control Limits: 70-130% except Pb, Tl, Sb, & Hg at 50-150%. No limits for Al, Ca, Fe, K, Mg & Na.

TDF #: A-098

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.7

Dissolved

Sequence ID#: 1508068

Instrument ID #: ICPOE - PE Optima

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508068-ICV1	Initial Cal Check	08/11/15	12:25
1508068-SCV1	Secondary Cal Check	08/11/15	12:28
1508068-ICB1	Initial Cal Blank	08/11/15	12:31
1508068-CRL1	Instrument RL Check	08/11/15	12:34
1508068-IFA1	Interference Check A	08/11/15	12:37
1508068-IFB1	Interference Check B	08/11/15	12:41
1508062-BLK1	Blank	08/11/15	12:45
1508062-BS1	Blank Spike	08/11/15	12:48
C150803-02	GKMSW01_081015	08/11/15	12:51
1508062-DUP1	Duplicate	08/11/15	12:54
1508068-SRD1	Serial Dilution	08/11/15	12:57
1508062-MS1	Matrix Spike	08/11/15	13:00
C150803-05	GKMSW02_081015	08/11/15	13:04
C150803-08	GKMSW04_081015	08/11/15	13:07
C150803-11	GKMSW05_081015	08/11/15	13:10
C150803-14	GKMSW11_080915	08/11/15	13:13
1508068-CCV1	Calibration Check	08/11/15	13:16
1508068-CCB1	Calibration Blank	08/11/15	13:19

TDF #: A-098

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.8

Dissolved

Sequence ID#: 1508069

Instrument ID #: ICPMS-PE DRC-II

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508069-ICV1	Initial Cal Check	08/11/15	12:39
1508069-SCV1	Secondary Cal Check	08/11/15	12:43
1508069-ICB1	Initial Cal Blank	08/11/15	12:46
1508069-CRL1	Instrument RL Check	08/11/15	12:49
1508069-IFA1	Interference Check A	08/11/15	12:53
1508069-IFB1	Interference Check B	08/11/15	12:56
1508063-BLK1	Blank	08/11/15	13:03
1508063-BS1	Blank Spike	08/11/15	13:06
C150803-02	GKMSW01_081015	08/11/15	13:09
1508063-DUP1	Duplicate	08/11/15	13:12
1508069-SRD1	Serial Dilution	08/11/15	13:15
1508063-MS1	Matrix Spike	08/11/15	13:18
C150803-05	GKMSW02_081015	08/11/15	13:21
C150803-08	GKMSW04_081015	08/11/15	13:24
C150803-11	GKMSW05_081015	08/11/15	13:27
C150803-14	GKMSW11_080915	08/11/15	13:30
1508069-CCV1	Calibration Check	08/11/15	13:33
1508069-CCB1	Calibration Blank	08/11/15	13:37

TDF #: A-098

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 245.1

Total

Sequence ID#: 1508072

Instrument ID #: CVAA FIMS - PE

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508072-ICV1	Initial Cal Check	08/11/15	15:55
1508072-ICB1	Initial Cal Blank	08/11/15	15:55
1508072-SCV1	Secondary Cal Check	08/11/15	15:55
1508072-IBL1	Instrument Blank	08/11/15	15:55
1508071-BS1	Blank Spike	08/11/15	15:55
1508071-BLK1	Blank	08/11/15	15:55
C150803-01	GKMSW01_081015	08/11/15	15:55
1508071-DUP1	Duplicate	08/11/15	15:55
1508071-MS1	Matrix Spike	08/11/15	15:55
C150803-04	GKMSW02_081015	08/11/15	15:55
C150803-07	GKMSW04_081015	08/11/15	15:55
C150803-10	GKMSW05_081015	08/11/15	15:55
C150803-13	GKMSW11_080915	08/11/15	15:55
1508072-CCV1	Calibration Check	08/11/15	15:55
1508072-CCB1	Calibration Blank	08/11/15	15:55

Project Name: Upper Animas_Surface Water 3_AUG 2015_A096

Certificate of Analysis

TDF #: A-098

TechLaw Inc, ESAT Region8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 150.1

WET

Sequence ID#: 1508073

Instrument ID #: pH Meter

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
C150803-03	GKMSW01_081015	08/11/15	16:29
C150803-06	GKMSW02_081015	08/11/15	16:29
C150803-09	GKMSW04_081015	08/11/15	16:29
C150803-12	GKMSW05_081015	08/11/15	16:29
C150803-15	GKMSW11_080915	08/11/15	16:29

TDF #: A-098

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: EPA 310.1

Total

Sequence ID#: 1508074

Instrument ID #: Mettler AT

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508066-SRM1	Reference	08/11/15	16:32
1508066-BLK1	Blank	08/11/15	16:32
C150803-03	GKMSW01_081015	08/11/15	16:32
1508066-DUP1	Duplicate	08/11/15	16:32
C150803-06	GKMSW02_081015	08/11/15	16:32
C150803-09	GKMSW04_081015	08/11/15	16:32
C150803-12	GKMSW05_081015	08/11/15	16:32
C150803-15	GKMSW11_080915	08/11/15	16:32
1508074-CCV1	Calibration Check	08/11/15	16:32
1508074-CCB1	Calibration Blank	08/11/15	16:32

TDF #: A-098

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.8

Total Recoverable

Sequence ID#: 1508077

Instrument ID #: ICPMS-PE DRC-II

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508077-ICV1	Initial Cal Check	08/11/15	12:39
1508077-SCV1	Secondary Cal Check	08/11/15	12:43
1508077-ICB1	Initial Cal Blank	08/11/15	12:46
1508077-CRL1	Instrument RL Check	08/11/15	12:49
1508077-IFA1	Interference Check A	08/11/15	12:53
1508077-IFB1	Interference Check B	08/11/15	12:56
1508077-CCV1	Calibration Check	08/11/15	13:33
1508077-CCB1	Calibration Blank	08/11/15	13:37
1508070-BLK2	Blank	08/11/15	16:17
C150803-01	GKMSW01_081015	08/11/15	16:20
1508070-DUP2	Duplicate	08/11/15	16:23
1508077-SRD1	Serial Dilution	08/11/15	16:26
1508070-SRM2	Reference	08/11/15	16:29
1508070-MS2	Matrix Spike	08/11/15	16:32
C150803-04	GKMSW02_081015	08/11/15	16:35
C150803-07	GKMSW04_081015	08/11/15	16:38
C150803-10	GKMSW05_081015	08/11/15	16:41
C150803-13	GKMSW11_080915	08/11/15	16:44
1508077-CCV2	Calibration Check	08/11/15	16:47
1508077-CCB2	Calibration Blank	08/11/15	16:51

TDF #: A-098

TechLaw Inc, ESAT Region 8

INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: 200.7

Total Recoverable

Sequence ID#: 1508078

Instrument ID #: ICPOE - PE Optima

Water

LSR #: A-096

Analysis ID	Sample Name	Analysis Date	Analysis Time
1508078-ICV1	Initial Cal Check	08/11/15	12:25
1508078-SCV1	Secondary Cal Check	08/11/15	12:28
1508078-ICB1	Initial Cal Blank	08/11/15	12:31
1508078-CRL1	Instrument RL Check	08/11/15	12:34
1508078-IFA1	Interference Check A	08/11/15	12:37
1508078-IFB1	Interference Check B	08/11/15	12:41
1508078-CCV1	Calibration Check	08/11/15	13:16
1508078-CCB1	Calibration Blank	08/11/15	13:19
1508070-BLK1	Blank	08/11/15	16:14
1508070-SRM1	Reference	08/11/15	16:17
C150803-01	GKMSW01_081015	08/11/15	16:20
1508070-DUP1	Duplicate	08/11/15	16:23
1508078-SRD1	Serial Dilution	08/11/15	16:26
1508070-MS1	Matrix Spike	08/11/15	16:30
C150803-04	GKMSW02_081015	08/11/15	16:33
C150803-07	GKMSW04_081015	08/11/15	16:36
C150803-10	GKMSW05_081015	08/11/15	16:58
C150803-13	GKMSW11_080915	08/11/15	17:01
1508078-CCV2	Calibration Check	08/11/15	17:04
1508078-CCB2	Calibration Blank	08/11/15	17:07